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Abstract

Corrupt contracts are illegal and, therefore, vulnerable to hold-up. That is, a bureaucrat who has accepted a bribe from a firm in exchange for a license may still choose not to grant the firm that license (hold-up). This paper develops a model to study the role that intermediaries play in preventing hold-up. There are two types of firms, good firms that are legally entitled to receive a license, and harmful firms that are not. Without intermediaries only good firms enter the market, and harmful firms do not enter because of hold-up. Intermediaries are legally permitted to help firms reduce their navigation costs of obtaining licenses. Thus, intermediaries increase entry of good firms. However, by utilizing the legal aspects of their transaction with good firms as leverage against the bureaucrat, intermediaries can prevent hold-up among harmful firms. Thus, intermediaries increase participation by both good and harmful firms and their welfare costs are ambiguous. Data obtained from occurrences of violations of the Foreign Corrupt Practices Act are broadly consistent with our model.

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Abstract

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1 Introduction

Corrupt contracts are not enforceable in a court of law and are therefore vulnerable to “hold-up". That is, a bureaucrat who has accepted a bribe from a firm in exchange for issuing a license or a permit may still choose not to grant the firm that license. In order to avoid this problem firms frequently employ middlemen or intermediaries to facilitate corrupt transactions. Thus, it has been argued that eliminating these intermediaries may make corruption more difficult, thereby reducing bribery (see Lambsdorff [2011] for a discussion of this issue). This argument ignores the fact the intermediaries provide many legal services to firms. A recent OECD study on the role of intermediaries in bribery asserts that “intermediaries provide many legitimate services to firms" despite the fact that they also “engage in bribing foreign officials" (OECD 2009). For example, because of their experience, intermediaries may be able to legally lower the firm's navigation cost of obtaining a permit. Indeed, the Foreign Corruption Practices Act of the U.S. acknowledges this by not prohibiting firms from making “facilitating payments for routine governmental action", including for issuing licenses, "that are already required by law" (O'Melveny 2009). However, intermediaries may also be able to facilitate the bribing of officials (and prevent hold-up) in order to obtain a business permit even when it is illegal to grant the firm such a permit. Indeed, as Lambsdorff and Teksoz (2005) state,

> a purely corrupt relationship is a rare thing. Corrupt deals are commonly embedded in more complex relationships between different actors. More often than not these relationships also entail a variety of legal transactions.

Other empirical studies of bribery also find that intermediaries are employed to conduct both legal and illegal services, sometimes for the same client and at other times for different clients. Bjorvatn, Torsvik, and Tungodden (2005), in their study of corruption in Tanzania, find that former bureaucrats, who were fired during an anti-corruption operation, become intermediaries. These former bureaucrats use their former contacts to foster corrupt transactions. In a recent "audit study" of procuring drivers licenses in New, Delhi, India, Bertrand et al. (2007) find that applicants often employ the services of intermediaries in order to obtain their license. In this context, intermediaries are employed to speed-up the processing time for a license, and enable their clients to procure a license even without taking the driving test. Although their study does not have any direct evidence of bribery, it suggests that a significant fraction of the fees that clients pay intermediaries is passed on the bureaucrat in the form of a bribe. Furthermore, based on the results of a subsequent driving test, they find that both "good" drivers (who should receive a license) and "poor" drivers (who should not), employ intermediaries in order to procure their license. Oldenberg (1987) similarly discusses the role of intermediaries in facilitating bribe payments in a land consolidation program for farmers in India. He finds that intermediaries are often used to pass on bribes to bureaucrats from their clients. He observes that these bribes are sometimes paid to "speed-up" perfectly legal land consolidation applications, while in other cases intermediaries are employed to facilitate improper or illegal land consolidation requests. Indeed, he states that the "overall transaction is proper even though the sub-transactions are corrupt."

In this paper we argue that the legal-illegal combination of the services that intermediaries provide is a critical element of the mechanism that intermediaries employ to prevent "hold-up". We develop a model to show that intermediaries are able to prevent corrupt contracts from being vulnerable to hold-up because they embed corrupt contracts within more complex, partially legal, contracts. Thus, as Lambsdorff (2002) notes, many corrupt contracts occur in the "shadow of the law" where "the legal transaction acts as a guarantor of the corrupt deal" (Lambsdorff, 2005). Specifically, in our model intermediaries legally reduce the navigation costs of seeking permits or licenses for firms. Hence intermediaries facilitate delivery of permits to firms that are legally entitled to receive this permit. However, they also attempt to obtain permits for firms that are not legally entitled to receive such permits. We show that intermediaries can exploit this combination of legitimate and illegitimate services to enforce occasional (i.e. one-shot) bribe contracts even in the presence of hold-up (and without resorting to infinitely repeated play or reputations).

To understand our intuition more clearly, consider a model with two types of firms: some that are legally eligible to apply for a license and others that are not. Both types of firms are subject to navigation costs that can be reduced by hiring the intermediary. A corruptible bureaucrat issues permits buts incurs some positive cost in doing so. The bureaucrat can withhold a permit from an eligible firm unless it is paid a bribe (extortion) or grant a license to an ineligible firm in exchange for a bribe (bribery). Both types of firms are subject to hold-up by the bureaucrat. Since we study a single period scenario, reputational concerns or other "repeated game enforcement mechanisms" cannot enforce the bribe contract, therefore, hold-up by the bureaucrat is credible. However, the institutional setting allows firms, whether eligible or ineligible, to appeal (at some cost) to a higher authority (or court) to request a license if their application was previously denied. Because of the existence of the appeals process, eligible firms are not subject to any hold-up.[1] However, since appeals are costly, these firms do pay a positive bribe to receive the permit. The ineligible firm, on the other hand, does not benefit from the appeals process and, therefore, is likely to be held-up by the bureaucrat after paying any bribe.

The solution to the hold-up problem is based on two key attributes associated with the presence of an intermediary. First, the intermediary enjoys substantial economies of scale in court costs so that once it goes to court, the costs of any future litigations are much lower. Second, an intermediary can engage in collective bribe negotiation with the bureaucrat so that if the bureaucrat fails to deliver the permit for a single firm, the intermediary can renegotiate the bribe amount for the remaining client firms. Specifically, suppose an intermediary has both eligible and ineligible firms as its clients and negotiates a bribe amount with the bureaucrat for a certain number of permits. The intermediary can first process the applications of the ineligible firms followed by the those of the eligible firms (the latter acting as the carrot). The intermediary can then charge the firm an up-front fee and promise

[1] Our use of the term "hold-up" should be distinguished from Lambert - Mogiliansky, Majumder, and Radner (2007) and Choi and Thum (2004). These papers refer to "hold-up" as the practice (by bureaucrats) of denying licenses to firms that are legally entitled to receive those licenses unless they are paid a bribe. In contrast, we identify this behavior as extortion and refer to hold-up as the practice of denying firms licenses to firms after they have paid a bribe, and irrespective of whether they are legally entitled to receive the license or not.

to pay damages to the firm if it fails to obtain a license on the firm's behalf. In the event of hold-up (for any ineligible firm), the intermediary can approach the court to seek relief from paying damages to the firm, and this triggers a renegotiation of the bribe which the intermediary has to pay the bureaucrat for the (remaining) eligible firms. Since the bribe amount depends on the court costs and costs exhibit returns to scale, this renegotiated bribe is lower following any incident of hold-up.[2] Thus, if the expected reduction in the future bribe from the intermediary is greater than its benefit from hold-up, the bureaucrat will not hold-up the licenses of any ineligible firms. Further, the intermediary is never held-up for any eligible firm as it can always approach the court to appeal against the non-issuance of permits.

After studying the conditions under which the above mechanism can prevent hold-up, we also study the welfare implications of intermediaries. We show that in the absence of intermediaries only legally eligible firms receive licenses, and that hold-up prevents ineligible firms from entering the market. In the presence of intermediaries the navigation costs for firms are lowered. As a result, more eligible firms enter the market. However, since intermediaries also provide services to illegal firms and enable them to "solve" the hold-up problem, the number of illegal firms also increases in the presence of intermediaries. Hence, the number of firms of both types increases in the presence of intermediaries, and to the extent the presence of ineligible firms is welfare reducing, there is a trade-off to eliminating intermediaries altogether.

Although, to our knowledge, ours is the first model to consider this mechanism using legal-illegal interface, there is a sizeable literature on the type of bureaucratic corruption that is studied in this paper.[3] The majority of these papers study the policy implications of bribery and do not explicitly model the transaction process of bribe contracts or the means by which they are enforced. More recent papers attempt to bridge this gap in the literature by studying the role of intermediaries. Bayar (2005), and similarly Bose and Gangopadhyay (2009), examine the role of intermediaries in a model where some bureaucrats are corrupt and others honest and where the identity of these corrupt bureaucrats is known only to

[2] Note that two types of appeals are possible in the presence of the intermediary. (i) The intermediary (or firm) vs. the bureacrat: here intermediary can appeal to the court if the eligible firm is denied a permit. (ii) The firm vs. the intermediary: The intermediary can appeal to the court to seek an injunction against payment of damages to the firm in the event of a failure to obtain permit.

[3] See Mookherjee and Png (1995), Mishra (2008), and Samuel (2009) and the references therein for a review of this literature.

the intermediary (and not the firm). Firms that approach corrupt bureaucrats directly may illegally receive a permit in exchange for a bribe, whereas firms that approach honest bureaucrats are punished for attempted bribery. Thus, because of their knowledge regarding the identity of bureaucrats, intermediaries lower the cost of bribery and are able to facilitate corrupt transactions even in situations where most bureaucrats are honest. Although their paper focuses on the "informational" role of intermediaries it does not examine the role that intermediaries may play in preventing "hold-up". Hasker and Okten (2008) similarly study the role of intermediaries in a model where firms may bribe bureaucrats directly, or through an intermediary. Firms are subject to hold-up, but because of their repeated interaction with bureaucrats, intermediaries are not subject to hold-up. In this context intermediaries worsen the impact of corruption because they facilitate bribery even in situations where the presence of hold-up would have otherwise prevented bribery from occurring.[4]

Although Hasker and Okten (2008) do not explicitly model the repeated-game between the intermediary and the bureaucrat, it is clear that intermediaries who repeatedly interact with bureaucrats can use trigger strategies or reputation mechanisms to guarantee that the bureaucrat does not renege on the bribe contract. Dechenaux and Samuel (2011) study the role of repeated play, while Besley and McLaren (1993), Carillo (2000), and Tirole (1992) study the role of reputation in enforcing bribe contracts in the presence of hold-up. These papers show that in settings with repeated interactions, bribery can be sustained despite the possibility of hold-up.

However, it may not always be possible for an intermediary to repeatedly interact with the same bureaucrat, and there are many instances in which one-shot (or occasional) bribe contracts do occur despite the potential for hold-up. In the absence of repeated interactions bribery may be sustained if the participants in the corrupt transaction can post hostages, as discussed in the literature on incomplete contracts (Williamson 1983). Buccirossi and Spagnolo (2006) and Lambsdorff and Nell (2007) show that leniency policies towards whistle-blowers can enforce bribe transactions in the presence of hold-up. That is, by obtaining hard evidence about the bribe transaction, the party vulnerable to hold-up can use it has a "hostage" and threaten to expose the illegal transaction (without fearing punishment themselves) if they are held-up. Thus, these papers show that a poorly designed leniency

[4] Other reasons for intermediaries have been proposed. Drugov et. al. (2011) find experimental evidence to support the hypothesis that intermediaries are used to lower the moral costs involved with corruption transactions. See Coffman (2011) for related study on intermediation and its impact on incentives.

policy can sustain bribery even in the presence of hold-up.

Our paper is related to these papers in that we study bribery in the presence of hold-up without relying on repeated play to enforce the bribe contract. However, instead of studying hostage mechanisms we show that bribery can be sustained when the intermediary provides both legitimate and illegitimate services to firms. In contrast to our paper, Buccirossi and Spagnolo (2006) assume that only firms that are not eligible for a permit pay a bribe. In our model both eligible (i.e. welfare enhancing) and ineligible (i.e. welfare reducing) firms have to pay bribes to a license. Thus, bribery is not necessarily welfare reducing because it may increase the number of eligible firms.

Following the introduction, the second section presents the benchmark model and derives the equilibrium without intermediaries, the third extends the benchmark model to include intermediaries. The fourth section considers various extensions and policy implications, and provides a welfare analysis of the presence of intermediaries. The welfare implications of eliminating intermediation are ambiguous and depend on various factors such as navigation costs, court costs, degree of red tape. Further, we use the model to examine the role of leniency policies in the presence of intermediaries. The final section concludes

2 The model

Consider a model with three risk-neutral players: entrepreneurs (E) (also referred to as firms), an intermediary (M) who plays the role of a middleman, and a bureaucrat. Entrepreneurs are of two types $i = \{g, h\}$, where g refers to the good or eligible type and h refers to the harmful type (that is ineligible for the license). There are total of n_g and n_h potential number of g and h type firms respectively, where $n_{i=\{g,h\}}$ is a positive integer. Each firm receives a private value of v if it is granted a license by a bureaucrat, where $\theta(v)$ is the probability density function of v, $\Theta(v)$ the distribution function, and where $\theta(v)$ is independent of $\{g, h\}$. Therefore, any firm can be identified by the pair (i, v). With slight abuse of notation we denote harm generated by the harmful types by h, where h is sufficiently large (relative to the distribution of v) so that all h type firms are welfare reducing if they are granted a license. The cost of obtaining the license (in order to realize the benefit v) is 0, however, procuring the license involves some additional navigation costs $\gamma > 0$. Bureaucrats hired by the government are paid a fixed wage of w. The cost to the bureaucrat of processing a license from either type of firm is $e > 0$. Bureaucrats do not receive any additional incentive payments for issuing licenses. We assume that both the type of the firm and the firm's v are observable by the bureaucrat. Bureaucrats are corruptible and attempt to extort payments from g types and bribes from h types. Distinguishing between these two forms of bribery is important because licenses should be issued to all g types and to none of the h types.[5]

Turning now to the institutional framework, there is a court (or some higher authority) that can be used to enforce only legal contracts. Specifically, if a firm's license application is rejected by a bureaucrat, the firm (or an intermediary acting on behalf of the firm) may decide to appeal to this court at a cost λ. We assume that λ is non-monetary, therefore, the court cannot reimburse the firm for these expenses. We denote the firm's decision to appeal to a court by $\delta \in \{C, NC\}$ (where C denotes appealing to the court and NC not appealing to the court). If a g type appeals then the court ensures that the bureaucrat exerts effort e to grant the firm the license, whereas a h type is never granted a license even if it appeals to a court. In addition, whenever the bureaucrat has received a bribe from a good firm, the court finds enough evidence to impose a, possibly small, but positive penalty f.[6] Implicit in this framework is the assumption that a g type firm that appeals to the court (after having paid a bribe) is granted immunity from any penalties for bribery. However, full immunity is not necessary for our results, and we discuss the implications of relaxing this assumption in Section 4.

2.1 Corruption in the absence of intermediaries

As a benchmark, consider a model without an intermediary. The extensive form of this game is given in Figure 1.

[INSERT FIGURE 1 ABOUT HERE]

First, consider the bribe negotiation between the firm and the bureaucrat, which we model as a Nash bargaining game. If an agreement is reached during the Nash bargaining stage, the bureaucrat receives the bribe in exchange for agreeing to exert effort (e) to process the license. Thus, the Nash bargaining bribe is paid with the *quid pro quo* agreement that the firm will be granted the license at some future stage. However, this Nash bargaining

[5] The bureaucrat colludes with the h-type to issue a license in exchange for a bribe.

[6] Note that there is no fine if the bureaucrat has not issued the license but has not taken any bribe. This is perhaps more realistic than the case where the court always fines the bureaucrat. Given that there are different types of firms, it is possible for the bureaucrat to mistake a g type as a h type and deny a license.

solution cannot be enforced and a bureaucrat may hold-up the firm by not granting the firm the license despite having accepted the bribe.[7] We denote the bureaucrat's decision to grant (or not grant) the license at this stage by $d \in \{Y, N\}$.

Within the framework specified above, if a bureaucrat holds up a firm, a g type firm will always choose to go to court. Since going to court results in a fine $f,$ a bureaucrat will never hold-up a g type firm. However, h type firms will never choose to go to court because appealing to the court does not produce a license. Thus, h type firms will always be held-up. Let x denote the bribe paid by a g type in exchange for license. Then the agreement and disagreement payoffs are

	Firm	Bureaucrat
agreement	$v - \gamma - x$	$x - e$
disagreement	$v - \gamma - \lambda$	$-e$

Given the above payoffs the Nash bargaining solution (assuming equal bargaining powers) x will be given by the solution to the maximization of the Nash product.

$$x = \arg\max_{x^{/}} (-x^{/} + \lambda) \cdot (x^{/}) = \frac{\lambda}{2} \tag{1}$$

Thus, conditional on choosing to apply for a license, a g type firm will pay a bribe $x = \frac{\lambda}{2}$. Since h type firms are always held-up, they will never pay a bribe in equilibrium. Consequently, the bribe paid by h type firms is, $b = 0$.[8]

Given this bribe game, we now turn to the entrepreneur's decision to apply for a license (and enter the market). Note that a g type firm can credibly threaten to take the bureaucrat to court only if $v > \lambda$. Further, the cost to a g type firm that chooses to apply for a license is $\gamma + \lambda/2$, therefore, a g type firm with $v > \lambda$ will choose to apply for a license only if $v > \gamma + \lambda/2$.

Under the assumption of sequential rationality, we solve for the sub-game perfect Nash equilibrium of the above game using backward induction. It is clear that, for any g type with $v \geq \max\{\lambda, \gamma + \lambda/2\}$ the following strategies constitute an equilibrium,

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[7]The bureaucrat saves $e > 0$ by holding up. There can be several other reasons why hold-up might be profitable but we do not consider these and focus more on the implications of such hold-ups.

[8]It should be noted that, if bribing were enforceable then the Nash bargaining solution between a bureaucrat an $h - type$ will yield a bribe of $\frac{v+e}{2}$.

$$\{x = \frac{\lambda}{2},\ \delta = C;\ d = Y\},$$

and it can be verified that this is an equilibrium satisfying backward induction.

We now turn to firms with $v < \lambda$. Note that in this case, a firm will never approach the court and consequently will always be held up by the bureaucrat. Irrespective of the outcome of Nash bargaining, the bureaucrat has no incentive to incur positive cost and issue the license. Since v is observable to the bureaucrat, any firm with $v < \lambda$ will not apply. We characterize this simple equilibrium in the following lemma.

Lemma 1 *A g type firm applies for a license if and only if $v \geq \max\{\lambda, \gamma + \lambda/2\}$ and h type firms do not enter the market due to hold up.*

Remark 2 *If the navigation costs are small relative to the litigation costs (i.e. $\gamma < \lambda/2$), then the entry decision to apply for a license is only affected by the litigation costs λ, and reducing the navigation cost γ will not change the number of firms.*

Navigation costs in our model may be interpreted as red tape, and it is often suggested that lowering red tape can reduce bribery and increase efficiency. Remark 2, however, suggests an interesting finding regarding the effectiveness of this policy. If the navigation costs are low relative to litigation costs, then lowering these navigation costs will not increase efficiency by increasing the number of good firms that enter the market.

3 Corruption with monopolistic intermediaries

We now consider the role of a monopolistic intermediary (M) who can reduce inefficiency by lowering the navigation cost γ. Due to its familiarity with the system, the intermediary's cost of navigating the bureaucracy to obtain a license is 0. A firm of type $i = \{g, h\}$ and an intermediary sign a contract where the firm pays m_i to the intermediary in order to navigate the application process (i.e. lower navigation costs to $\gamma = 0$) and procure the license. This reflects Bray's (2005) assertion that,

> [b]y employing a local agent or a representative, companies can cut down the time needed to get to know new markets and thus reduce the costs of operating

there. Intermediaries may also act as a buffer against demands for bribes: they can make their decisions whether or not to pay, according to local custom.

We denote the actual number of applicant firms of type i by k_i, where $k_i \leq n_i$. If the intermediary succeeds in obtaining the license the game ends. However, if the bureaucrat holds-up the intermediary and does not grant the license, the firm receives damages $D > 0$ from the intermediary, unless the intermediary appeals to the court at cost T to avoid paying these damages.[9] Note that there two types of appeals. The first occurs when an appeal is made by the intermediary (against the bureaucrat) for not issuing a license. In this case, the court examines the appeal and bureaucrat is required to grant licenses to the g type firms, while h type firms are not granted the license. The second type appeal occurs when, irrespective of the type of firm, an intermediary approaches the court to seek relief from damages D. Note that because the intermediary provides both types of firms with a legitimate service (reducing navigation costs), the court cannot penalize it for contracting with the h types.[10] As before, the intermediary's decision to approach the court is denoted by $\delta, \delta \in \{C, NC\}$.

The intermediary's court costs take a specific form in that it depends on the number of its client firms. Specifically, there is a fixed cost F that is incurred only once, and a variable cost Z for each appeal that the intermediary chooses to make. Stated formally, let $\delta(n)$ denote the decision by the intermediary to approach the court regarding the n^{th} license. Suppose $\delta(n) = NC$ for $n = 1, ...n-1$, then the total cost of going to court for the n^{th} firm is $T = F + Z$. On the other hand, if $\delta(n) = C$ for some $n^{/} < n$, then the cost of going to court for each $n > n^{/}$ is $T = Z$. It should be noted that the logic behind this cost function is similar to that found in Gintis' (2009) analysis of a firm's choice between hiring a lawyer only if it is accused of wrongdoing, and keeping a lawyer on "retainer" permanently. By maintaining a lawyer on retainer a firm incurs only the marginal cost and not the fixed cost for its legal defense, whereas by hiring a lawyer only after it has been accused it must incur

[9] The damage clause may state that: "the intermediary shall pay the firm D in the event it fails to make sufficient effort in procuring the license." Alternatively, the responsibility of claiming D may rest with the firm. In section 4 we discuss this possibility and show that the results of our model are robust to this alternative framework.

[10] It may appear inconsistent that the intermediary is not penalized by the court for attempting to obtain a license for the h types. However, we assume that the intermediary's knowledge of the firm's type is soft (not third-party verifiable), therefore, it cannot be responsible for agreeing to lower the navigation costs of either type of firm.

both the fixed and the marginal cost of legal fees. In our model, the intermediary's fixed cost may be interpreted as the costs of hiring a lawyer on retainer. Once these costs have been sunk, it incurs only the marginal cost for each appeal k.[11]

3.1 A market with g types

To see how the presence of the intermediary affects the market, we begin with a market with only g types. In contrast to the game without an intermediary where each firm negotiates independently with the bureaucrat, here the intermediary and the bureaucrat negotiate over an aggregate bribe B_g in exchange for a specific number of licenses. As we did previously, we assume that this bribe is determined through Nash bargaining between the intermediary and the bureaucrat. The time-line of the game is outlined below and characterized in the extensive form game (see Figure 2).

[INSERT FIGURE 2 ABOUT HERE.]

1. In period 0 firms realize their value for the licence v, drawn from the distribution θ. The intermediary chooses fees m_g and D.

2. Given their valuation v and the fees m_g, k_g number of g type firms sign a contract with the intermediary to help lower negotiation costs and deliver the licenses.

3. The intermediary and the bureaucrat negotiate (through Nash bargaining) over an aggregate bribe B_g in exchange for k_g number of licenses to be granted. In the absence of any agreement, the bureaucrat chooses whether to issue any license. If k_g number of licenses are not issued, intermediary can approach the court at a cost T (described above) in order to appeal the bureaucrat's decision. Since the firm is a g type, the court instructs the bureaucrat to issue the license.

4. In the event of an agreement, bribe B_g is paid and the k_g licenses are granted if the bureaucrat chooses not to hold-up the intermediary. If the bureaucrat holds-up and issues $l < k_g$ licenses, the intermediary must decide whether to go to court or not. If the intermediary chooses not go to court, it must pay D to each of the $k_g - l$ firms for failing to procure the licenses on their behalf. If the intermediary appeals to the court, the bureaucrat is forced to process the licenses and is penalized f for having accepted

[11] A similar cost structure is also found in Konrad and Skaaperdas (1997)

a bribe. Conditional on going to court, the intermediary always avoids paying total damages amounting to $D(k_g - l)$.

It is clear that in any equilibrium (satisfying subgame perfection) the bureaucrat never holds up the intermediary and will always deliver the license ($l = k_g$) if it expects the intermediary to approach the court (i.e. if $\delta = Y$). Thus, assuming the damages are sufficiently large, which we determine more precisely below, the intermediary will always approach the court if the license is not delivered. Thus, there is no hold-up in this equilibrium with g types.

Turning to the Nash bargaining game, the disagreement payoffs O_B, O_M for the bureaucrat and the intermediary are given by

$$O_B = -k_g e \tag{2}$$
$$O_M = -(F + k_g Z). \tag{3}$$

In the disagreement game, the intermediary approaches the court to seek licenses for k_g firms resulting in the payoff $-(F + k_g Z)$. The bureaucrat's disagreement payoff reflects the fact that it will be asked to issue k_g licenses. Assuming that the intermediary seeks licenses for k_g firms, the bribe B_g will be given by the solution to the following maximization of the Nash product.

$$B_g = \arg\max(-B - (-F - k_g Z)) \cdot (B - k_g e + k_g e) = \frac{F + k_g Z}{2} \tag{4}$$

We now compare this case with the previous case without intermediaries (eq 1). Note that the presence of an intermediary affects the firm's costs in two ways. First, as discussed earlier it reduces the navigation cost from γ to 0. Second, if $\lambda > Z + F/k_g$, then each firm's extortion payment (now paid through the intermediary) is also reduced. Thus, assuming that the intermediary does not expropriate the entire surplus, a firm's payoff will be higher in the presence of an intermediary.[12]

From the preceding discussion, it is clear that the benefit to the firm from the introduction of intermediation depends on the total surplus generated by the intermediary and the exact

[12] But this is only a sufficient condition. Even if the expected extortion payment $\lambda/2$ is not reduced the firm may still prefer a middleman because the reduced navigation cost may offset potentially a higher extortion payment. Specifically, if $\lambda \geq Z + F/k_g - 2\gamma$, the firm will prefer to have a middlemen.

division of this surplus. The total surplus depends on the size of the navigation cost γ and the difference in legal costs $(\lambda - (Z + F/k_g))$. Note that the legal costs with intermediation is a function of the number clients the intermediary has. Hence, this will number (k_g) be endogenously determined in equilibrium. The sharing of the total surplus will depend on the bargaining between the firm and the intermediary. We have assumed that there is only one intermediary and it chooses the fee to maximize its profit. Firms take the fee as given and make their entry decisions accordingly.

Assumption 1: The intermediary chooses the fee m, but the firm can always exercise its outside option and apply for the license on its own.

Assumption 2: Trade is feasible between the intermediary and the firm, that is, $\gamma + \frac{\lambda}{2} > \frac{Z}{2}$.

Assumption 3: The intermediary knows the distribution $\Theta(v)$, but an individual firm's v is private information. We assume $\Theta(v) \sim U[\underline{v}, \overline{v}]$, and that $n_g \cdot (\frac{\overline{v}-m}{\Delta v}) \geq 1$ at $m = \gamma + \frac{\lambda}{2}$,where $\Delta v = \overline{v} - \underline{v}$.That is, $\overline{v}$ is large enough so that even in the absence of an intermediary, at least one g type firm wants to enter the market.

Proposition 3 *Suppose all potential entrants are g types. Under Assumptions 1 - 3, with sufficient number of potential firms (that is, there exists $\overline{n}_g$ such that if $n_g \geq \overline{n}_g$) intermediation is profitable and the intermediary will set its fees,*

$$m_g^* = \min\{\frac{\overline{v}}{2} + \frac{Z}{4}, \gamma + \frac{\lambda}{2}\}.$$

In this case the number of g type firms entering the market will not be lower compared to the case without intermediation.

Proof. Assumption 1 implies that the following incentive compatibility constraint must be satisfied,

$$\gamma + \frac{\lambda}{2} \geq m_g.$$

Hence to set the fees, the intermediary solves the following maximization problem.

$$Max \quad k_g(m_g) \cdot m_g - \frac{F + k_g(m_g)Z}{2}, \text{ subject to } \gamma + \frac{\lambda}{2} \geq m_g.$$

Using Assumption 3 we note that the expected number of firms that will enter the market for a given m is,

$$k_g(m) = n_g \cdot (\frac{\overline{v} - m_g}{\Delta v}), \text{ where } \Delta v = \overline{v} - \underline{v}. \tag{5}$$

Combining the previous two equations, the intermediary's profit function is,

$$n_g \cdot (\frac{\overline{v} - m_g}{\Delta v})[m_g - \frac{Z}{2}] - \frac{F}{2}. \tag{6}$$

It can be shown that the solution to the first order condition is,

$$m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4} \tag{7}$$

Note that the intermediary's profit is strictly increasing in m at $m = 0$. Thus, either the profits are increasing in m for all $m \in [0, \gamma + \frac{\lambda}{2}]$, in which case the solution is $m_g^* = \gamma + \frac{\lambda}{2}$, or the solution is an interior solution given by $m_g^* = \frac{\overline{v}}{2} + \frac{Z}{4}$. However, this solution does not guarantee that the intermediary's profits are positive. Specifically, if the fixed costs $F/2$ are large, then the intermediary's profits may be negative.

We now show that under Assumptions 1 - 3, there always exists an $\overline{n}_g$ such that for all $n_g \geq \overline{n}_g$ the intermediary can make a positive profit. First, consider the case where $\frac{\overline{v}}{2} + \frac{Z}{4} \leq \gamma + \frac{\lambda}{2}$, so that the optimal $m = \frac{\overline{v}}{2} + \frac{Z}{4}$. Since $\frac{\overline{v}}{2} + \frac{Z}{4} \leq \gamma + \frac{\lambda}{2}$, from Assumption 3 it follows that $\frac{\overline{v}}{2} + \frac{Z}{4} < \overline{v}$. A straightforward calculation shows that,

$$\begin{aligned} \frac{\overline{v}}{2} + \frac{Z}{4} &< \overline{v} \Longleftrightarrow \\ \frac{\overline{v}}{2} - \frac{Z}{4} &> 0. \end{aligned}$$

This last inequality implies that the first term in the intermediaries profit function (6) is strictly positive. Thus, if

$$n_g > \frac{\frac{F}{2}}{(\frac{\overline{v}-m}{\Delta v})[m - \frac{Z}{2}]} = \overline{n}_g \tag{8}$$

the profit to the intermediary is positive. Second, consider the case where $\frac{\overline{v}}{2} + \frac{Z}{4} > \gamma + \frac{\lambda}{2}$, so that the intermediary charges $m_g^* = \gamma + \frac{\lambda}{2}$. Under Assumption 2, the first term in 6 is again strictly positive, thus, if

$$n_g > \frac{\frac{F}{2}}{(\frac{\overline{v}-m}{\Delta v})[m - \frac{Z}{2}]}$$

then the intermediary's profit is positive. Thus, there exists an $\overline{n}_g$ such that for all $n_g \geq \overline{n}_g$ the intermediary can make a positive profit.

To show that the number of firms will not be lower, recognize that the intermediary chooses m such that $\gamma + \frac{\lambda}{2} \geq m$ thus, at least as many (or more firms) will enter the market with an intermediary than without. ■

3.2 Market with g types and h types

We now turn to a market with both g types and h types. Recall that in the absence of intermediaries only the g types apply for a license, while the h types abstain from entering the market because of hold-up. We now show that in the presence of an intermediary h types may be able to avoid the hold-up problem and enter the market. Consider the following time line that informally characterizes the extensive form game with both types. The corresponding extensive form of this game is found in figure 3.

1. In period 0 firms realize their their value for the licence v, drawn from the distribution θ. The intermediary chooses fees m_g, D and m_h.

2. Given their valuation v and fees m_g and m_h, k_g firms of type g and k_h firms of type h sign a contract with the intermediary.

3. The intermediary and the bureaucrat negotiate over the total bribe B and the total number of licenses $k = k_h + k_g$ to be awarded. They also agree whether to implement the agreed contract in a *single stage* or in a *phased* manner. In a single stage contract the bribe B is made in one payment, where as in a phased contract part of the bribe B_h is paid for the k_h licenses of the h types, and another bribe amount is paid later for the delivery of the licenses for the g types. If there is no agreement, the intermediary chooses whether to make any license application on behalf of the firms and whether to approach the court.[13]

4. If the bureaucrat does not hold-up, k licenses are granted.

5. If the bureaucrat chooses to hold-up it issues $l < k$ licenses. The intermediary must then decide whether to go to court or to pay the damages D to firms which have been denied licenses. For the g types it can go to the court with an appeal for the license to be granted. In this case the license is issued and the bureaucrat is fined f if a positive bribe was exchanged. Conditional on going to court, the intermediary always avoids paying the damages D.

6. If the bureaucrat and the intermediary agreed to a phased contract in stage 3, they can renegotiate the contract for the remaining phase(s) following hold-up by the bureaucrat.

[13] Note that in the two-stage contract the intermediary pays the bribe before the bureaucrat issues the licenses for the h types, therefore, the intermediary cannot hold-up the bureaucrat.

Having solved the game with only g types in the previous section, we focus our analysis on the h types. Recall that for the h types, the intermediary cannot force the bureaucrat to grant it the licenses, but it can approach the court to avoid having to pay D. As in the case with g types only, we first study the negotiation between the bureaucrat and the intermediary using the concept of Nash Bargaining solution.

Let k_h, k_g be the number of h types and g types who have paid the required fees (m_h, m_g) to engage the services of the intermediary. If the bureaucrat and the intermediary fail to agree, the disagreement payoffs will be given by

$$O_B = -k_g e \tag{9}$$

$$O_M = -(F + kZ) \tag{10}$$

In the disagreement game, the intermediary approaches the court to seek licenses for k_g firms resulting in the payoff $-(F+k_g Z)$. For the h types, it will approach the court to avoid the damage payments, leading to a payoff of $-k_h Z$. The bureaucrat's disagreement payoff reflects the fact that it will be asked to issue k_g licenses. Assuming that M seeks licenses for k firms, the bribe B will be given by the solution to the maximization of the Nash product,

$$B = \arg\max\{[-B' - (-F - kZ)] \cdot [B' - ke + k_g e]\} = \frac{F + kZ + k_h e}{2}. \tag{11}$$

Proposition 4 *Suppose $F > 2e$, n_g sufficiently large, and Assumptions 1-3 are satisfied. There exists a two-phased contract where the intermediary pays B_h to receive k_h licenses for the h types, followed by B_g to receive k_g licenses. In this case both types of firms enter the market, and hold-up does not occur.*

Proof. We prove the above result in three steps.

(1) First, we show that there exists a phased contract where the intermediary first pays B_h for k_h licenses for the h types, followed by B_g for k_g licenses, where $B_h = (k_h Z + k_h e)/2$ and $B_g = (F + k_g Z)/2$.

Suppose the bureaucrat holds up the intermediary and issues $l < k_h$ licenses in the first phase. This will cost the intermediary a total of $(k_h - l)D$ in damages. Even if there is only one h type, as long as $D > Z + \frac{F}{2}$, the intermediary will choose to approach the court to avoid paying damages.[14] We assume that D satisfies this constraint so that the intermediary can commit itself to go to court. Following hold-up, the intermediary renegotiates the (second stage bribe) bribe for the remaining k_g firms. This renegotiated bribe is also determined through Nash bargaining, but disagreement payoffs for the bureaucrat and the intermediary are now $O_B = -k_g e$ and $O_M = -(k_g Z)$ respectively. Hence the renegotiated bribe is $B_g^r = k_g Z/2$.

In the second stage, upon payment of B_g^r the bureaucrat will issue k_g licenses. Hold-up is not profitable at this stage because the intermediary can always go to court to seek licenses for the g types. Further, since a bribe has been exchanged, the bureaucrat will incur a penalty $f > 0$. Hence, hold-up is never optimal. Since the bureaucrat does not hold-up in the second stage, its expected payoff from holding up in the first stage decreases by $F/2$, but its benefit from holding up is $(k_h - l)e$. Since benefits from holding up is maximized for $l = 0$, hold up will not occur in the first stage if $F/2 \geq k_h e$, or $2k_h e \leq F$.

(2) Hold-up will not be profitable as long as $k_g \geq 1$. Recall that the equilibrium number of firms of each type depend on n_i and the fee m_i. The fees charged must be large enough to cover the intermediary's bribe payment B, which is additively separable in k_g and k_h. Thus, the fraction of the bribe B (see 11) that is allocated in the first stage towards procuring the licenses for the h types will not affect the intermediary's profit maximizing choice of m_g, and in turn the number of g types that apply for a licenses (k_g). Hence, the middleman's profit from the h types will not depend on the number of g types (and vice-versa) and m_g will be determined exactly as in proposition 3. It can be shown that $m_g^* = \min\{\frac{\overline{v}}{2} + \frac{Z}{4}, \gamma + \frac{\lambda}{2}\}$, $k_g = n_g \cdot (\frac{\overline{v} - m_g^*}{\Delta v})$, and Assumption 3 ensures that $k_g \geq 1$.

Next, we determine the fees that will be charged by the intermediary for the h types. The middleman will choose m_h to solve the following maximization problem.

$$Max \quad k_h(m_h) \cdot m_h - \frac{k_h(m_h)(Z+e)}{2}, \quad \text{subject to } k_h(m_h) \leq \frac{F}{2e}.$$

Note that the constraint is the "no hold-up" constraint that ensures that the bureaucrat does not hold-up. A straightforward calculation shows that,

$$m_h^* = \frac{\overline{v}}{2} + \frac{(Z+e)}{4} \tag{12}$$

[14] This inequality is solved for the existence of at least one h type. Note that it only incorporates half the fixed cost ($F/2$) because the rest of this cost is recovered through the renegotiated bribe payments for the second phase. (i.e. the renegotiated bribe falls by $F/2$).

Substituting this into the constraint implies that,

$$n_h \cdot (\frac{\overline{v} - m_h^*}{\Delta v}) \leq \frac{F}{2e}. \tag{13}$$

Condition $F > 2e$ is clearly necessary to ensure that there are some h types in the market.[15]

(3) Finally, we determine conditions that ensure that the intermediary's profit is positive. First, note that we must have $\overline{v} > m_h^*$,otherwise none of the h types would apply for a license. Now, using (7) & (13), it can be shown that the intermediary's profit is,

$$\{n_g \cdot (\frac{\overline{v} - m_g^*}{\Delta v})(m_g^* - \frac{Z}{2})\} + \{n_h \cdot (\frac{\overline{v} - m_h^*}{\Delta v})(m_h^* - \frac{Z+e}{2})\} - \frac{F}{2}, \tag{14}$$

which is strictly positive only if,

$$n_g \geq \frac{\frac{F}{2} - \{n_h \cdot (\frac{\overline{v} - m_h^*}{\Delta v})(m_h^* - \frac{Z+e}{2})\}}{(\frac{\overline{v} - m_g^*}{\Delta v})(m_g^* - \frac{Z}{2})} = \overline{\overline{n}}_g. \tag{15}$$

■

The above result shows that the presence of an intermediary (along with g types) makes it possible for the h types to enter the market, when previously they would not have been able to do so. Thus, both h types and intermediaries benefit from this transaction.

We study inequality (15) to understand the implications of the previous proposition. Observe that (15) is weaker than the profitability condition (8) for $\overline{n}_g$ derived in proposition 3; that is, $\overline{\overline{n}}_g < \overline{n}_g$. When $n_g \geq \overline{n}_g$ the intermediary receives the same profits from g types because m_g is the same regardless of whether both types of firms are present or absent, and a strictly positive profit from h types. When $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, then the intermediary is able to receive a positive profit from g types, when previously it would not have offered its services to good firms. Thus, in this case it receives positive profits from g types, in addition to the profit it receives from h types. Consequently, its profits are always strictly higher in the presence of both types of firms, which implies that whenever the potential number of good firms (n_g) is sufficiently large ($> \overline{\overline{n}}_g$), it will also want to offer its services to h types. Second,

[15] Although we focus only on a two stage bribe, several multi-stage contracts are feasible. Indeed, the aggregate bribe B (as in 11) can be partitioned into several payments made at each stage. However, regardless of the number of stages, the total bribe (in the absence of hold-up) must be equal to B. If hold-up were to occur at some stage, the renegotiated bribe will always be always be reduced by $F/2$, regardless of the number of stages.

this result implies that are values of $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, where intermediaries would be absent in the presence of only g type firms, but where they are present if there are both g and h type firms. Thus, interestingly, when $n_g \in (\overline{\overline{n}}_g, \overline{n}_g)$, the presence of h types increases the number of g types that enter the market. The following corollary summarizes these results.

Corollary 5 *The presence of h type firms increases the range over which intermediaries are willing to provide services for g type firms. Further, the intermediary's profit is always higher from serving both types of firms.*

Intuitively, in the absence of h types the intermediary offers its services to g types only when there are sufficiently many potential g types (i.e. n_g sufficiently large). However, when both types of firms are present, the intermediary cross-subsidizes the profits obtained from providing its services to h types, in order to provide its services to g types even when there are relatively few g types present.

4 Discussion and Extensions

In the absence of intermediaries, hold-up is a "blessing-in-disguise" because it prevents corruption and entry of the h type firms.[16] The previous sections have shown how intermediation can solve the hold-up problem and encourage corruption. In this section we study the welfare implications of intermediaries, and the various policies that the government may adopt in order to regulate intermediaries and prevent corruption. We also offer a variation of our model in which the responsibility of of suing the intermediary rests with the firm We also offer some empirical evidence in support of our model.

4.1 Welfare

Assume that $\underline{v} > e$ and that the harm h from the h types is greater than $\overline{v}$. These two conditions ensure that in the first best world the regulator will want to grant licenses to all g types and to none of the h types.This immediately implies that the presence of intermediaries is always welfare enhancing when there are only g types (see Proposition 3). Since $m_g \leq \gamma + \frac{\lambda}{2}$,

[16] This is in sharp contrast to the hold-up problems in the context of legal contracts where, hold-up possibilities can lead to under-investment.

the number of firms entering the market will always be (weakly) greater with an intermediary than without. The more interesting case is when there are both g and h types. Since the presence of h types increase the range over which intermediaries provide services for g types, it suggests that the welfare gain from g types will be realized even for smaller values of n_g. However, since there are welfare losses from h types and intermediaries facilitate the entry of these h types, the overall welfare implications of intermediaries will be ambiguous when there are both types of firms.

Formally, with both types of firms, the social welfare (SW) in the presence of an intermediary is given by

$$SW = n_g \int_{m_g^*}^{\overline{v}} v\ \theta(v) dv + n_h \int_{m_h^*}^{\overline{v}} (v-h)\ \theta(v) dv.$$

Under Assumptions 1 - 3, this above expression simplifies to

$$\frac{n_g}{2\Delta v}((\overline{v})^2 - (m_g^*)^2) + \frac{n_h}{2\Delta v}((\overline{v})^2 - (m_h^*)^2) - \frac{n_h h}{\Delta v}(\overline{v} - m_h^*). \tag{16}$$

Since $h > \overline{v} > m_h^* > m_g^*$, the above expression may be positive or negative.

In the absence of an intermediary, the social welfare is

$$n_g \int_{\gamma+\frac{\lambda}{2}}^{\overline{v}} v\ \theta(v) dv,$$

which simplifies to

$$\frac{n_g}{2\Delta v}((\overline{v})^2 - (\gamma + \frac{\lambda}{2})^2). \tag{17}$$

To avoid biasing our results, we assume that $n_g = n_h$. Under this assumption an intermediary is welfare enhancing if and only if the following condition is satisfied

$$\frac{1}{2\Delta v}((\overline{v})^2 - (m_g^*)^2) + \frac{1}{2\Delta v}((\overline{v})^2 - (m_h^*)^2) - \frac{h}{\Delta v}(\overline{v} - m_g^*) > \frac{1}{2\Delta v}((\overline{v})^2 - (\gamma + \frac{\lambda}{2})^2)$$

which simplifies to,

$$\overline{v}^2 - m_g^{*2} - m_h^{*2} - 2h\overline{v} + 2hm_h^* + (\gamma + \frac{\lambda}{2})^2 > 0. \tag{18}$$

Note that the above inequality may hold for certain parameter values and eliminating intermediaries may result in welfare losses to society.[17] Hence it is not always optimal to eliminate

[17] In the case of the following example, welfare is improved with an intermediary. $\overline{v} = 3, \underline{v} = 1, Z = .5, e = .2, \gamma = 2, \lambda = 1, h = 3, F = 4, n_g = n_h = 5$. The net gain in social welfare with an intermediary is, 1.85, the intermediary's profit is 7.11, the expected number of g types who enter the market 3.4, and h types 2.2. All other constraints can also be shown to be satisfied.

intermediaries, even though this reduces corruption. We now study the comparative statics of the above expression

Proposition 6 *There exists a* $\overline{\gamma} \geq 0$*, such that for all* $\gamma > \overline{\gamma}$*, the presence of an intermediary improves welfare. Furthermore, the (welfare) gains from an intermediary are increasing in* e*,* γ*, and* λ*. They are increasing in* z *if and only if* $(h - \overline{v}) > \frac{Z}{2} + \frac{e}{4}$

Proof. The welfare gains from an intermediary are increasing in γ. Thus, for some sufficiently large γ the presence of an intermediary will raise welfare (relative to the case without an intermediary). Substituting the expressions for m_h^* and m_g^*, into the expression $\overline{v}^2 - m_g^{*2} - m_h^{*2} - 2h\overline{v} + 2hm_h^* + (\gamma + \frac{\lambda}{2})^2$, and taking the derivative yields the above results. ■

The welfare from allowing intermediaries to function is larger when the navigation costs γ are large because intermediaries eliminate these navigation costs. (This is despite the fact that intermediaries lower the navigation costs for both good and harmful types.) Further, the welfare gain from an intermediary is increasing in the individual firm's court costs (λ) because firms are able to "outsource" their legal expenses to an intermediary and exploit the intermediary's economies of scale. Interestingly, an increase in e (the bureaucrat's cost of effort) also raises the welfare gains from an intermediary. This occurs because an increase in e increases the fee that the intermediary charges the h types but does not affect the fee that it charges the g types. Thus, an increase in e reduces the participation of h types while not affecting the participation of g types, therefore, a higher e increases the welfare gains from an intermediary. If we interpret e broadly as red-tape, then our model suggests that an increase in red-tape will, surprisingly, raise welfare because it decreases the participation among h types, while not affecting the participation of g types.

4.2 Leniency Policies

Our framework implicitly assumes that the government offers leniency to any entrepreneurs who appeal to the court. Such leniency policies have attracted considerable attention recently. Basu (2011) recommends that bribe giving should be made legal (while bribe taking remain illegal) in order to encourage bribe givers to cooperate with the authorities and expose bribe takers. However, the effectiveness of leniency policies has been contested elsewhere in the literature (Spagnolo, 2004). Indeed, it may be argued that although leniency policies should be applied towards individual firms, they should not be applied towards intermediaries. In this section, we evaluate the effectiveness of leniency policies towards both entrepreneurs and intermediaries.

Consider a model with only g types and absent an intermediary. Suppose that entrepreneurs are not granted leniency, but are fined $f_E > 0$ when they go to court to appeal the bureaucrat's decision to not grant them the license after having paid a positive bribe. The model described in section 3 assumes that $f_E = 0$, which we will take to be the case with a leniency policy. The following result identifies the welfare implications of introducing a leniency policy.

Proposition 7 *Suppose all firms are g types, then a leniency policy that sets $f_E = 0$ will never lower welfare. It will always raise welfare if the navigation costs (γ) are sufficiently small.*

Proof. We prove this result by showing that choosing to set $f_E > 0$ never increases the expected number of firms that will enter the market. Therefore, choosing $f_E = 0$ will never lower welfare.

Following the reasoning offered in the proof of Lemma 1, a firm that pays a positive bribe will be enter the market only if it can credibly threaten to take the inspector to court. Hence, conditional on paying a positive bribe, v must be greater than $\lambda + f_E$. Firms that choose to pay a positive bribe will enter the market only if their v is larger than their expected costs $\gamma + \frac{\lambda}{2}$. Thus, firms that enter the market and pay a positive bribe ($x > 0$) must satisfy the condition: $v > \max\{\gamma + \frac{\lambda}{2}, \lambda + f_E\}$. Of course, given that there are now penalties for bribery, a firm may instead choose to pay no bribe and, conditional on its application being rejected, go to court to appeal this decision. A firm that chooses to pay $x = 0$ will enter the market only if $v > \gamma + \lambda$.

For firms that choose to pay a positive bribe, there are now two possible cases: (a) $\gamma + \frac{\lambda}{2} > \lambda + f_E$,or (b) $\gamma + \frac{\lambda}{2} < \lambda + f_E$. First consider case (a). In this case, if $v > \max\{\gamma + \frac{\lambda}{2}, \lambda + f_E\}$, the constraint $v > \lambda + f_E$ is not binding, therefore, a leniency policy will have no affect on the expected number of firms that will enter the market. All firms with $v > \gamma + \frac{\lambda}{2}$ will enter the market and pay a bribe $x = \frac{\lambda}{2}$. Bureaucrats will not hold-up the firm since $v > \gamma + \frac{\lambda}{2} > \lambda + f_E$. That is, since $v > \lambda + f_E$, the firm can credibly threaten to go to court. For firms with $v < \gamma + \frac{\lambda}{2}$, note that this condition implies that $v < \gamma + \lambda$. Since $\gamma + \lambda$ is the total cost of entering the market for these firms, firms with $v < \gamma + \frac{\lambda}{2} < \gamma + \lambda$ will never enter the market even if they were to pay $x = 0$. Thus, the only firms with $v \geq \gamma + \frac{\lambda}{2}$ enter the market. Next consider case (b) where $\gamma + \frac{\lambda}{2} < \lambda + f_E$. Here there are two further (sub) cases: (i) If $\gamma + \frac{\lambda}{2} < \gamma + \lambda < \lambda + f_E$, then firms with $v \in (\gamma + \lambda, \lambda + f_E)$ will choose $x = 0$, and will enter the market. Thus, in this case, all firms with $v \geq \gamma + \lambda$ will enter the market, and a decrease in f_E will have no affect on the number of firms. (ii) $\gamma + \frac{\lambda}{2} < \lambda + f_E < \gamma + \lambda$, then only firms with $v > \lambda + f_E$ will enter the market and pay a positive bribe. In this case a decrease in f_E will raise the number of firms (and increase welfare).

In case (a) and (b, i) the expected number of firms is not affected by f_E, whereas in case (b, ii) the expected number of firms that enter the market will be lower when $f_E > 0$, than when $f_E = 0$. Thus, it follows that a leniency policy, which sets $f_E = 0$ can never lower welfare. ■

Having shown that leniency policies are never welfare reducing in the absence of intermediaries, we now examine whether a regulator will find it optimal to extend these policies to intermediaries. Consider the model with intermediaries in the presence of only g types. Recall that intermediaries may go to court at cost $F + kZ$ in order to appeal the bureaucrat's decision to deny the license. Suppose that the intermediary is not granted leniency, but is fined $f_M > 0$ for having paid a bribe $B = \frac{F+kZ}{2}$. The model described in section 3.2 corresponds to the case with a leniency policy with $f_M = 0$. Note that an intermediary can always commit to going to court by choosing a D that is sufficiently large. Thus, if D is unconstrained then leniency policies do not matter and the result characterized in the previous section still holds; that is, intermediary always improves welfare when there are only g types. If D is constrained so that the maximum damages that the firm can demand is $D \in (F + kZ, F + kZ + f_M)$, then the intermediary will not pay a bribe. In this case the intermediary will only be employed by the firm in order to lower it's navigation and court costs. Specifically, the intermediary will choose m to maximize,

$$k(m)m - F + k(m)Z,$$

which yields $m = \frac{\overline{v}+Z}{2}$. Note that in this case the firm's fees increase by $Z/4$, therefore, the participation rate of good types fall and not having leniency for the middleman is will be welfare reducing. Thus, whether the firm applies for a license directly, or through an intermediary, leniency policies can never lower welfare.[18]

[18] Another policy that we do not consider explicitly is penalties for negligence. Suppose the bureaucrat is penalized for negligence, that is, for not granting a license to the $g-types$. In this case, without intermediaries

4.3 The "Damage Clause"

Our model assumes that if the intermediary is unable to procure a license for the firm, then it must pay damages D unless it appeals to the court. Arguably, the responsibility of the legal action may rest on the firm since the firm is the one that has been "wronged". In this section, we outline a slight modification to our model in which the responsibility of legal action rests with the firm. We show that the results of section 3.1 and 3.2 are robust to the possibility of the firm choosing to sue the intermediary for damages.

Consider a model identical to that outlined in section 2 and 3, except that the decision to sue the firm for damages in the event of not receiving a license rests with the firm. The cost of taking the intermediary to court is identical to those identified earlier: λ. Further, when an h type firm sues the intermediary for these predetermined damages, D, the intermediary can defend itself in court by hiring legal counsel, where the cost structure of these legal fees is identical to those described in section 3. If an h type firms sues the intermediary, it is awarded damages D with probability α, where α is the conditional, joint, probability of receiving these damages (conditional on the firm taking the intermediary to court and the intermediary hiring its legal defense). The probability α represents the possibility that courts are imperfect and may occasionally grant damages even to h type firms. An intermediary that doesn't defend itself will have to pay damages to the firm with certainty.

In this alternative framework, as long as $\alpha D > \lambda$, all h type firms go to court. For, the intermediary, as long as $(1-\alpha)D > Z + \frac{F}{2}$, it will prefer to go to court rather than pay these damages. Combining these two inequalities yields, $D > Z + \frac{F}{2} + \lambda$. Sparing the reader tedious algebra, it follows that $m_h^* = \frac{\overline{v}}{2} + \frac{(Z+e+\alpha D)}{4}$, while m_g^* remains the same as (7). Thus, allowing for the firm to sue the intermediary implies that the intermediary takes on more risk when contracting with h types. Consequently, the intermediary's costs and hence its fees for h types are higher in this version of our model. Given that the fees for h types is higher, fewer h types will enter into an agreement with the intermediary and all else being equal the intermediary's profit will be smaller in this version of the model than that in expression (14). Consequently, the critical number of g types needed to subsidize the entry of h types will need to be higher. That is, $\overline{\overline{n}}_g$, will be larger. Thus, for intermediate values of α, our model is robust to the possibility that the responsibility of legal action rests with the firm.

all firms with $v > \max\{\gamma, \lambda\}$ will participate. Further, it can be shown that with an intermediary, the intermediary will charge a fee of $m = \overline{v}/2$. If the intermediary is profitable, then it wil be welfare enhancing.

4.4 Empirical Evidence

We provide below some simple descriptive statistics to highlight the role of intermediaries in the context of our theoretical model. These data involve occurrences of violations of the U.S. Foreign Corruption Practices Act (FCPA). The FCPA "imposes civil and criminal penalties for any U.S. person or corporation to make a corrupt payment to any foreign government official, directly or indirectly to obtain or retain business" (O' Melveny 2009). In 1986 the scope of this act was extended to include FCPA violations for any foreign nationals acting as intermediaries of a U.S. business. Under this extension a U.S. firm may be prosecuted under U.S. law for the corrupt practices of any of its intermediaries. The data, collected by the authors from the U.S. Department of Justice, includes cases between 1998 and 2007. It shows that intermediaries were employed in slightly over 40% of all corrupt transactions (among instances of corruption where the D.O.J. brought charges).[19] As can be seen from Table 1, the bribes paid to foreign officials in the presence of intermediaries is, on average, higher than those paid when firms use intermediaries to facilitate corrupt transactions 1.[20]

	Mean bribe (USD)	Mean bribe (Euro)
Intermediary present	2,749,500 (90)	582,314 (6)
Intermediary absent	351,185 (46)	173,583 (25)

This finding is consistent with our model. If bribes through the intermediary are higher, we should expect these firms to prefer to bribe bureaucrats directly (instead of through the intermediary). However, a higher average bribe with intermediaries will be observed if the market has both g and h types, and the intermediary offers its services to both groups.

More formally, our theoretical model predicts that in the absence of intermediaries only good types will pay bribes, therefore, the expected (average) bribe is $\frac{\lambda}{2}$. With intermediaries the intermediary's fees must satisfy $\frac{\lambda}{2} + \gamma \geq m_g$. Further, for the intermediary to make a profit, $(k_g \cdot m_g)$ must be strictly greater than B_g, that is, $m_g \geq \frac{B_g}{k_g}$. Combining these two inequalities it follows that, $\frac{\lambda}{2} + \gamma > \frac{B_g}{k_g}$.

[19] All details are available from: http://www.justice.gov/criminal/fraud/fcpa/cases/a.html

[20] Sample sizes are in parenthesis, and since some bribes were paid in Euros while others in USD, they are presented separately. It should be noted that this data is not a random sample since it includes only those cases that came to the attention of the U.S. D.O.J. Further, cases where the D.O.J. did not have evidence of the exact (or approximate) bribe amount paid were dropped, as were cases where there was ambiguity regarding the use of an intermediary.

If intermediaries only provide services to good firms either (1) $\frac{\lambda}{2}+\gamma > \frac{F+k_gZ}{2k_g} > \frac{\lambda}{2}$ or (2) $\frac{\lambda}{2}+\gamma > \frac{\lambda}{2} > \frac{F+k_gZ}{2k_g}$.Noting that $\frac{F+k_gZ}{2k_g} = \frac{B_g}{k_g}$,case (1) along with our model implies that the following chain of inequalities,

$$\frac{\lambda}{2} < \frac{B_g}{k_g} < m_g < \frac{\lambda}{2} + \gamma$$

must be satisfied. This chain of inequalities implies that $\gamma > m_g - \frac{B_g}{k_g}$, where $m_g - \frac{B_g}{k_g}$ is the intermediary's profit per (good) firm However, in this case the intermediary can earn a higher profit by only offering to reduce the firm's navigation costs (since it can charge each firm up to γ), and firms will bribe bureaucrats on their own. Thus, case (1) implies that intermediaries will not engage in bribery.

Under case (2), $\frac{\lambda}{2}+\gamma > \frac{\lambda}{2} > \frac{F+k_gZ}{2k_g}$, that is, the average bribe without an intermediary is greater than the average bribe with an intermediary if there are only good types. This is inconsistent with our data unless there are both good and harmful types. With both good and harmful types the average bribe with an intermediary is,

$$\frac{F+k_gZ}{2(k_g+k_h)} + \frac{k_h(Z+e)}{2(k_g+k_h)},$$

which can be greater than bribes without an intermediary ($\frac{\lambda}{2}$) if e is sufficiently large.[21] Thus, our model is consistent with the empirical finding that average bribe without an intermediary is greater than the average bribe.

It should be noted, however, that these empirical observations should be viewed as merely suggestive. Clearly, there are alternative models that could be consistent with these statistics and more careful analysis needs to be done before these results may be seen as conclusive.

5 Conclusion

This paper studies the role of intermediaries in facilitating corrupt transactions and preventing hold-up. Although the previous literature has studied the role of intermediaries in enabling corruption, none of these papers have examined the mechanism through which intermediaries prevent hold-up. Our analysis of intermediation highlights the mixture of both

[21] Our model also predicts that the bribes will be independent of v, the firm's profits, although it is difficult to verify this.

legal and illegal services that middleman offers and how it is difficult to separate these two aspects.

We show that in the absence of intermediaries only good firms enter the market, and harmful firms are dissuaded from entering the market because bureaucrats can hold-up their license applications. In the presence of intermediaries who lower navigation costs, the number of good firms increase. Thus, if only good firms are present, and the potential number of good firms is sufficiently large so that intermediaries can profit from them, then intermediaries unambiguously improve social welfare.

When both good and bad firms are present, we show that intermediaries can employ the legal elements of their business (i.e. services to good firms) in order to prevent hold-up from occurring to harmful firms. Intermediaries always receive a higher profit from serving both types of firms and, therefore, procure licenses for both good and harmful firms. Thus, the possibility of hold-up no longer prevents harmful firms from entering the market. Hence it is clear that the legal arm of the middleman is pre-requisite for the illegal arm to function. Interestingly however, because intermediaries profit from both types of firms, the existence of harmful firms has a positive impact on the participation of good firms by making intermediation viable for a larger range of parameter values. Thus, in contrast to models of adverse selection where the bad drives out the good, in our model good and bad firms complement each other through an intermediary. Specifically, the presence of harmful firms raises the profitability of intermediation and makes it viable, enabling more good firms to enter the market, and good firms in turn make it possible for harmful firms to avoid hold-up, thereby encouraging more harmful firms to enter the market.

With regard to the welfare effects, we find that since more good and harmful types enter the market in the presence of an intermediary, the welfare costs of intermediaries are ambiguous in general. However, we show that as long as the navigation costs are sufficiently large, intermediaries will enhance welfare even when both types of firms are present.

Our paper also examines whether bribe giving by intermediaries should be made legal, in certain circumstances. The prior literature shows that legalizing bribe giving (for some types of bribes) can reduce corruption (Basu 2011), however, it has not examined whether such policies should be extended to intermediaries who pay bribes on behalf of firms. Our paper shows that if only good firms are present, then leniency policies will enhance welfare even in the presence of intermediaries.[22]

[22]Note that when only good firms are present, all bribes are extortionary (or harassment bribes), hence

It has been argued that eliminating intermediaries can reduce corruption. Although, intermediaries provide illegal services, they also offer legal services sometimes even to the same firm. Indeed, although our model considers a market with many firms, it can be interpreted more broadly as a single firm with several license applications, some of which are legal and others illegal. For example, a real estate developer may apply for several building permits, some of which may be legal, while others illegal. Our model shows that these legal services can be used as leverage against the bureaucrat in order to prevent hold-up among the illegal applications. In fact, our analysis can be applied in several other contexts such as the delivery of developmental goods and services, and the implementation of public programmes. In all these contexts, intermediaries serve both as informational navigator and bribe facilitator. Our analysis shows that eliminating intermediaries is not the most efficient way to reduce corruption.

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this is an extension of the earlier claim by Basu (2011). These findings are also related to Spagnolo (2004).

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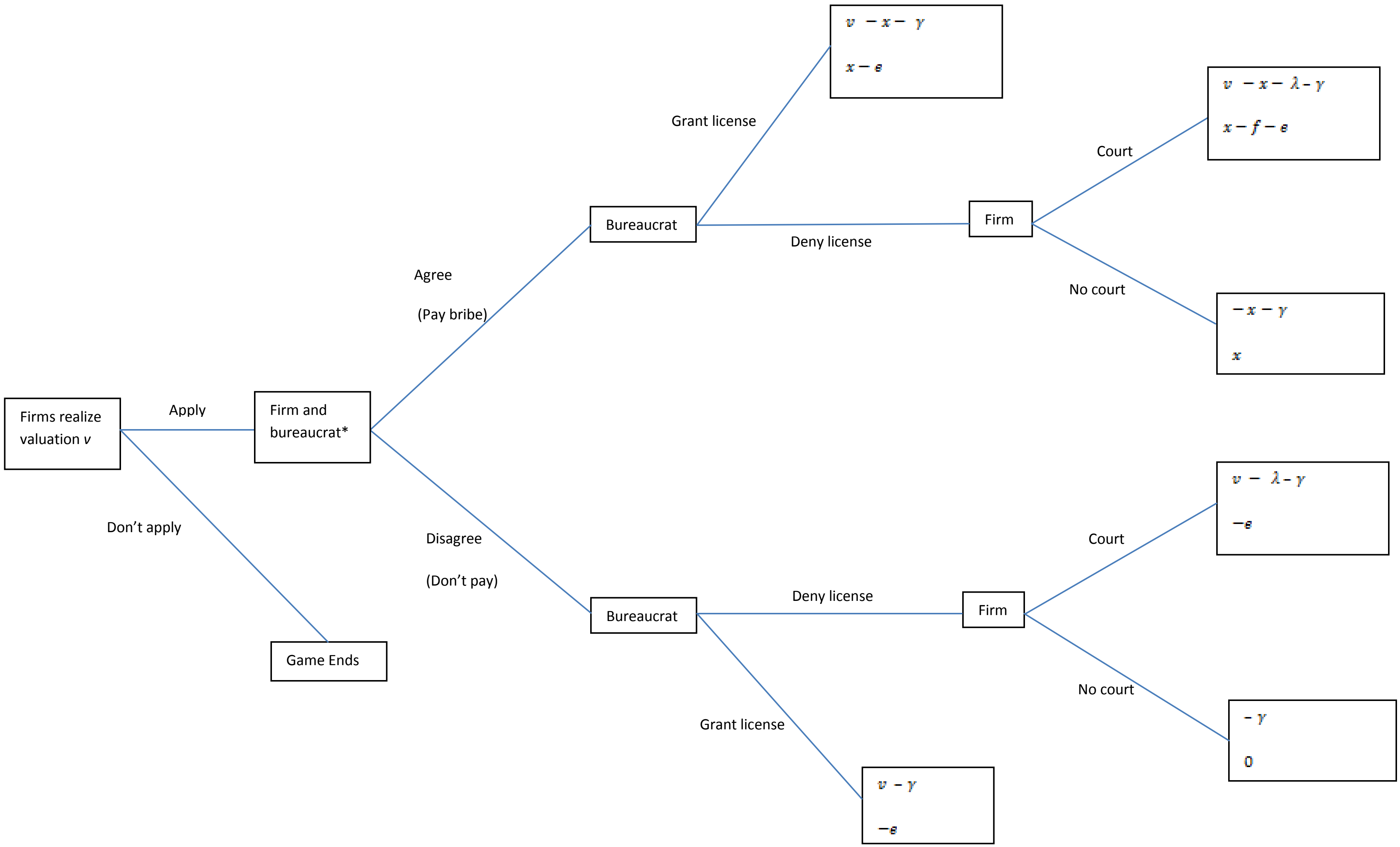
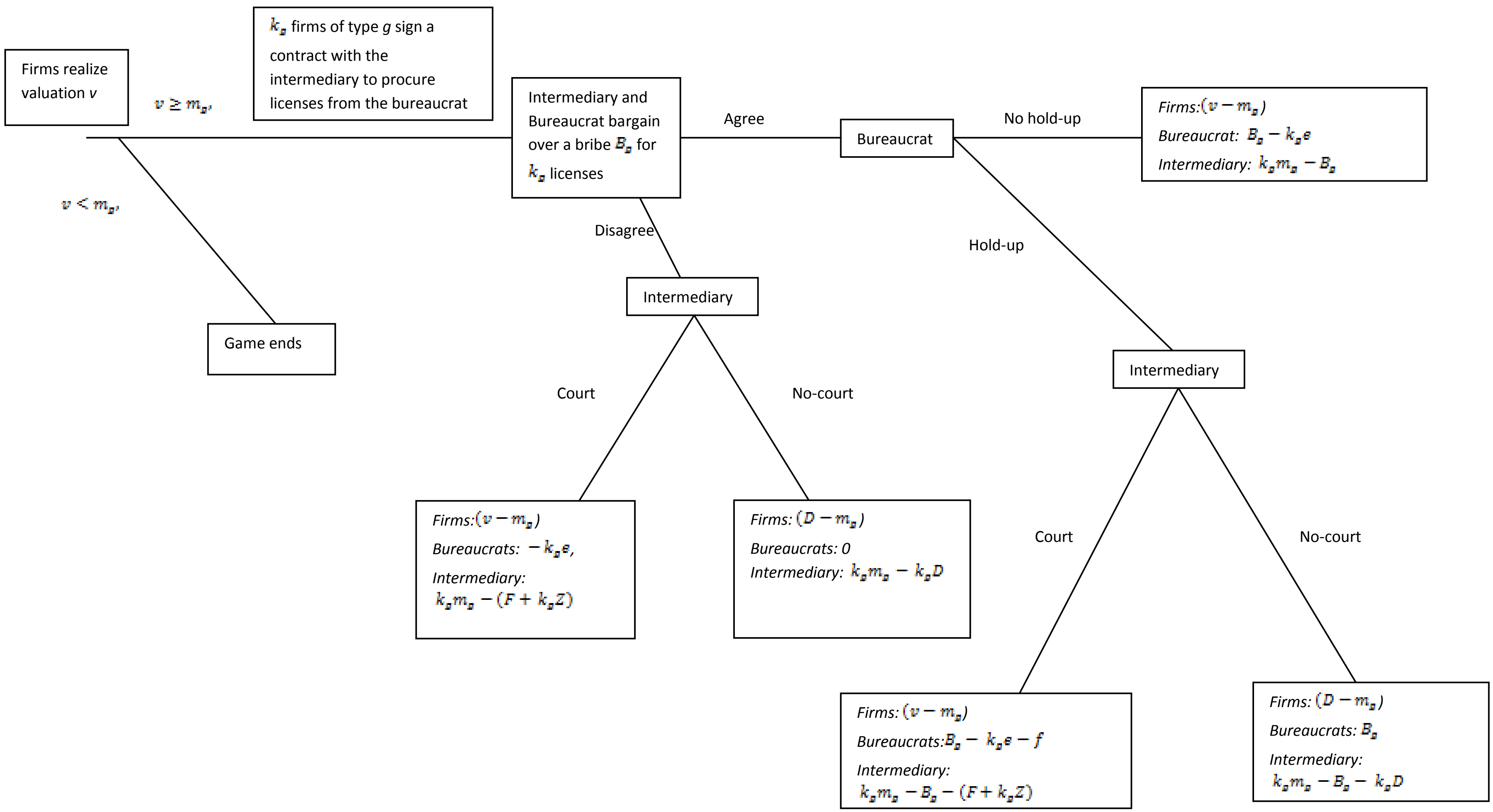


Figure 1: Game tree for the game with only g-types (no intermediaries)

*Note that this box represents a cooperative game phase.



Firms realize valuation v
$v \geq m_g$,
$v < m_g$,
Game ends
k_g firms of type g sign a contract with the intermediary to procure licenses from the bureaucrat
Intermediary and Bureaucrat bargain over a bribe B_g for k_g licenses
Agree
Disagree
Bureaucrat
No hold-up
Hold-up
Firms: $(v - m_g)$
Bureaucrat: $B_g - k_g e$
Intermediary: $k_g m_g - B_g$
Intermediary
Court
No-court
Firms: $(v - m_g)$
Bureaucrats: $-k_g e$,
Intermediary: $k_g m_g - (F + k_g Z)$
Firms: $(D - m_g)$
Bureaucrats: 0
Intermediary: $k_g m_g - k_g D$
Intermediary
Court
No-court
Firms: $(v - m_g)$
Bureaucrats: $B_g - k_g e - f$
Intermediary: $k_g m_g - B_g - (F + k_g Z)$
Firms: $(D - m_g)$
Bureaucrats: B_g
Intermediary: $k_g m_g - B_g - k_g D$

Figure 2.

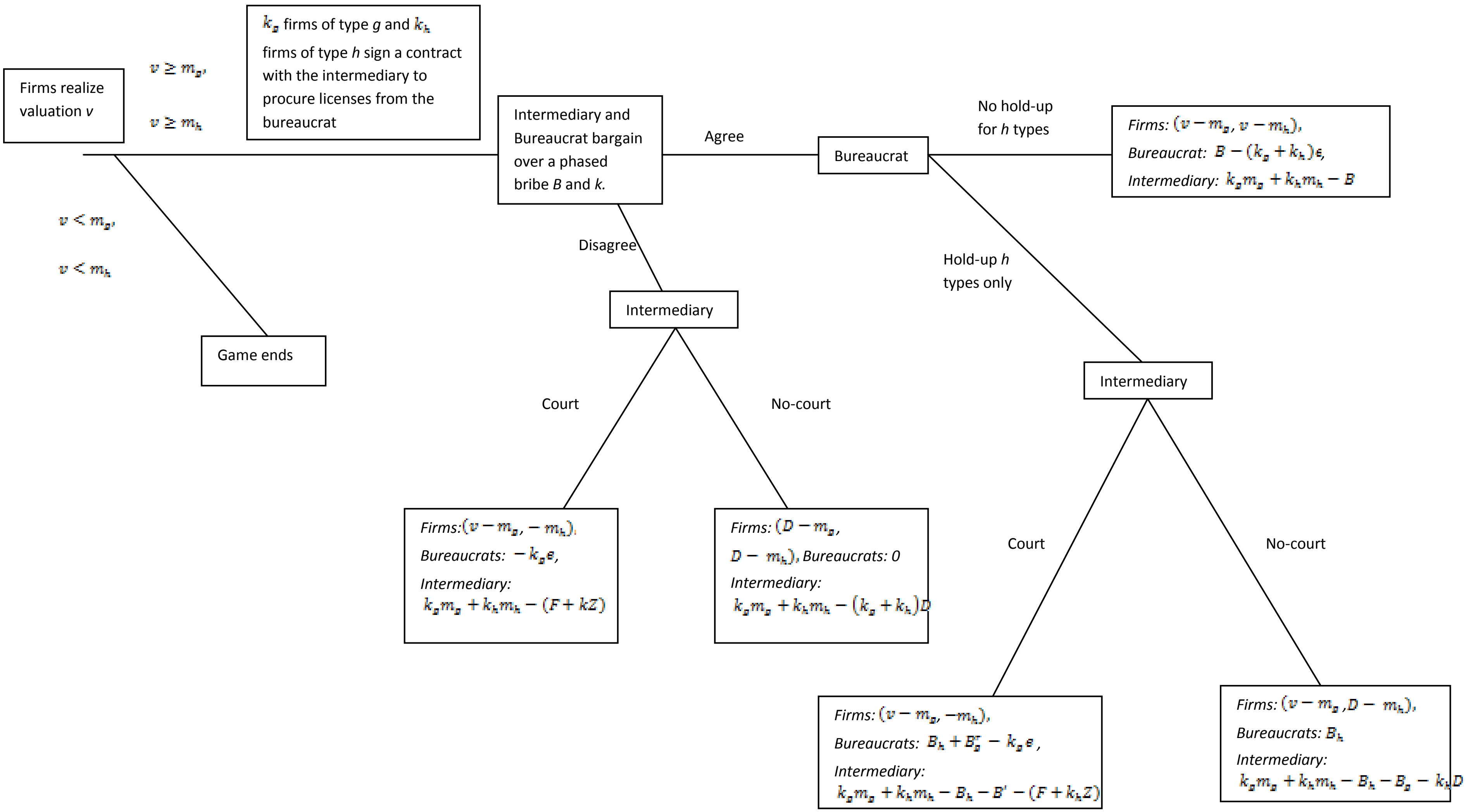

Firms realize valuation *v*
$v \geq m_g$, $v \geq m_h$
k_g firms of type *g* and k_h firms of type *h* sign a contract with the intermediary to procure licenses from the bureaucrat
$v < m_g$, $v < m_h$
Game ends
Intermediary and Bureaucrat bargain over a phased bribe *B* and *k*.
Agree
Disagree
Bureaucrat
No hold-up for *h* types
Firms: $(v - m_g, v - m_h)$, *Bureaucrat:* $B - (k_g + k_h)\epsilon$, *Intermediary:* $k_g m_g + k_h m_h - B$
Hold-up *h* types only
Intermediary
Court
No-court
Firms: $(v - m_g, -m_h)$, *Bureaucrats:* $-k_g \epsilon$, *Intermediary:* $k_g m_g + k_h m_h - (F + kZ)$
Firms: $(D - m_g, D - m_h)$, *Bureaucrats: 0* *Intermediary:* $k_g m_g + k_h m_h - (k_g + k_h)D$
Intermediary
Court
No-court
Firms: $(v - m_g, -m_h)$, *Bureaucrats:* $B_h + B_g^r - k_g \epsilon$, *Intermediary:* $k_g m_g + k_h m_h - B_h - B' - (F + k_h Z)$
Firms: $(v - m_g, D - m_h)$, *Bureaucrats:* B_h *Intermediary:* $k_g m_g + k_h m_h - B_h - B_g - k_h D$

Figure 3.